Math 212
Quiz 19

F 14 Oct 2016

Your name: _____

Exercise

(5 pt) Find the global minimum and maximum values of the function $f : \mathbf{R}^2 \to \mathbf{R}$ given by

$$f(x, y) = x^3 - 3y^2 + 6xy - 9x$$

on the closed square $D \subseteq \mathbf{R}^2$ given by

$$D = \left\{(x, y) \in \mathbf{R}^2 \,|\, 0 \leqslant x \leqslant 2, 0 \leqslant y \leqslant 2\right\}.$$

(a) (.5 pt) Justify why a global minimum and maximum exist in this case. *Hint:* Name a theorem, and validate its hypotheses.

(b) (2 pt) Find all critical points in the interior of D. *Hint:* You should find exactly one.

(c) (2 pt) Find all critical points on the boundary of D. *Hint:* You should find exactly five. Four of these are the corner points of D; to save time, note this, and look for "interior" critical points along the boundary, analyzing the four boundary components of D separately.

(d) (.5 pt) State the global minimum and maximum values of f on D.